8. AN ANNOTATED REPORT OF MITES INFESTING MEDICINAL PLANTS OF WEST BENGAL, INDIA

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Introduction

Mites, taxonomically grouped as Acari, are responsible for infesting timber, fruits, crops, tea and vegetables, stored grains and ornamental as well as medicinal plants, and thus act as pest in many instances (Chhillar *et al.* 2007). Little work has been done in India in general, and West Bengal in particular, on mite fauna of conventional medicinal plants; the available works are of Lal and Mukherjee (1977) from Uttar Pradesh, Sadana *et al.* (1981) from Punjab, Ghosh (2004) from Arunachal Pradesh, Rolania and Sharma (2008) from Rajasthan, Ghosh and Gupta (2003), Lahiri *et al.* (2004, 2005), and Gupta (2005) from West Bengal. In recent past, Roy *et al.* (2006, 2008a, b, c, 2009, 2010), and Roy and Saha (2010) have made substantial contribution on different aspects of mites infesting medicinal plants of West Bengal.

Collection of mites for taxonomic study

A systematic survey was conducted between January 2004 and December 2008 at different medicinal plant gardens and wilderness situated in different districts of West Bengal. The districts surveyed were Darjeeling, Jalpaiguri, Cooch Behar, Bardhawan, Medinipur (West), Medinipur (East), Howrah, Hooghly, Purulia, Nadia, 24-Parganas (North), 24-Parganas (South) and Kolkata. During sampling, leaves and other parts such as stem, barks, buds of different medicinal plants were observed minutely with magnifying glass and infested leaves were plucked and placed in plastic sachet (< 0.2 micron thickness) and labelled as suggested by Faraji *et al.* (2004). The leaves and the polythene bags were further checked under a stereozoom binocular in a laboratory to note the presence of mite, if any. Though aphids, ants, beetles, and bugs were noted from the collected samples, data on only mites were considered for the present study. After counting the mites on the infested plant parts, all specimens of phytophagous and predatory mites were preserved in 70% ethyl alcohol using fine sable hairbrush for further taxonomic studies.

The infested medicinal plants collected were identified with assistance from the Department of Botany, University of Calcutta, and herbarium collection of Ramakrishna Mission Ashrama, Narendrapur, Kolkata. The scientific names of the plants used in the present research work are based on Das and Mandal (2003) and Paria (2005).

Preparation of slides and identification of mite species

Temporary slides were prepared using lactic acid (50%) and permanent slides were made using Hoyer's medium (Krantz 1978). Specimens were identified using a light microscope and comparing with published descriptions and illustrations without recourse to type specimens. Available literature like Gupta (1985, 1987, 2002, 2003), Gupta and Gupta (1994), Bhattacharyya *et al.* (2000), Mohanasundaram (2001) and Chaudhury (2009) was followed. Classification of phytoseiids mites used in this paper is that of Chant and McMurtry (1994, 2007). The slide containing specimens, including holotypes are at present kept in the Entomology and Wildlife Biology Research Laboratory, Department of Zoology, University of Calcutta.

Results and Discussion

A total of 99 species of mites, belonging to 40 genera and 17 families under 3 orders were observed during the entire study period. Among these, 33 phytophagous mite species belonging to 12 genera and 4 families (Table 1a) and 66 predatory mite species belonging to 28 genera and 13 families (Table 1b) were found to occur in different districts of West Bengal infesting more than 80 species of medicinal plants. The present study includes new reports of 25 species of phytophagous mites from their respective host plants and 27 species of predatory mites for the first time from their respective habitat. Among phytophagous mites, the predominant genera were *Brevipalpus*, represented by 10 species, followed by *Tetranychus*, represented by 8 species. *Tetranychus urticae* was recorded from maximum, i.e. 7 different host plants followed by *Eutetranychus orientalis* and *Tetranychus ludeni* which were isolated from 4 and 3 different host plants, respectively. Among predatory mites, the genus *Euseius* is predominant represented by 8 species, followed by *Agistemus*, *Amblyseius* and *Phytoseius*

Table 1: List of mite species recorded during 2004-2008 from different medicinal plants in different districts of West Bengal

(a) List of phytophagous mite species:

Mite species	Host plant/ habitat	District	Remarks
Order I. PROSTIGMATA			
Family 1. TETRANYCHIDAE Donnadieu			
Genus 1. *Petrobia* Murray			
1. *Petrobia* (*Tetranychina*) *harti* (Ewing)	*Oxalis corniculata* Linn.	Kolkata & 24-Parganas (S)	
Genus 2. *Eutetranychus* Banks			
2. *Eutetranychus caricae* Nassar & Ghai	*Ficus carica* L.	Kolkata & 24-Parganas (S)	
3. *E. orientalis* (Klein)	*Aegle marmelos* (L.) Corr. ex Roxb., *Carica papaya* L., *Withania somnifera* Dunal, *Datura metel* Linn.	Kolkata & 24-Parganas (S), Bardhawan	New record on *Datura metel*
Genus 3. *Eotetranychus* Oudemans			
4. *Eotetranychus* sp.	*Murraya koenigii* (L.) Spreng.	Kolkata & 24-Parganas (S)	
Genus 4. *Oligonychus* Berlese			
5. *Oligonychus biharensis* (Hirst)	*Datura metel* Linn.	Hooghly	New record on this host
6. *O. indicus* (Hirst)	*Musa paradisiaca* L., *Cocos nucifera* L., *Saccharum officinarum* L.	Howrah, Kolkata & 24-Parganas (S)	New record on *Cocos nucifera*
7. *O. oryzae* (Hirst)	*Cymbopogon winterianus* Jawitt	Kolkata & 24-Parganas (S)	
Genus 5. *Panonychus* Yokoyama			
8. *Panonychus citri* (McGregor)	*Crateva nurvala* Buch.-Ham, *Carica papaya* L.	Kolkata & 24-Parganas (S)	New record on *Crateva nurvala*
Genus 6. *Schizotetranychus* Trägardh			
9 *Schizotetranychus baltazari* Rimando	*Murraya koenigii* (L.) Spreng., *Curcuma zedoaria* Rosc.	Kolkata & 24-Parganas (S)	New record on *Curcuma zedoaria*
10. *S. cajani* Gupta	*Murraya koenigii* (L.) Spreng. *Indigofera tinctoria* Linn., *Cymbopogon martini* (Roxb.) Watt., *Phyllanthus fraternus* Webster	Kolkata & 24-Parganas (S)	New record on *Murraya koenigii* and *Phyllanthus fraternus*
11. *S. hindustanicus* (Hirst)	*Murraya koenigii* (L.) Spreng.	Kolkata & 24-Parganas (S)	
Genus 7. *Tetranychus* Dufour			
12. *Tetranychus cinnabarinus* (Boisd.)	*Datura metel* Linn.	Darjeeling	New record on this host
13. *T. fijiensis* Hirst	*Pongamia pinnata* (L.) Pierre	Kolkata & 24-Parganas (S)	New record on this host
14. *T. hydrangeae* Pritchard & Baker	*Datura innoxia* Mill.	Hooghly	New record on this host
15. *T. ludeni* Zacher	*Abutilon indicum* (L.) Sweet, *Tinospora cordifolia* (Willd.) Hook.f. & Thoms., *Datura metel* Linn.	Kolkata & 24-Parganas (S); Medinipur (W)	New record on *Abutilon indicum* and *Tinospora cordifolia*
16 *T. macfarlanei* Baker & Pritchard	*Withania somnifera* (L.) Dunal	Jalpaiguri	
17. *T. neocaledonicus* André	*Withania somnifera* (L.) Dunal, *Abelmoschus moschatus* Medik., *Leucas plukenetii* (Roth.) Spreng.	Kolkata & 24-Parganas (S), Medinipur (W)	New record on *Withania somnifera* and *Leucas plukenetii*
18. *T. urticae* Koch	*Aristolochia indica* Linn., *Withania somnifera* Dunal, *Justicia adhatoda* Linn., *Datura metel* Linn., *Murraya koenigii* (L.) Spreng., *Ocimum sanctum* Linn., *Sida rhombifolia* Linn.	Darjeeling, Kolkata & 24-Parganas (S) Hooghly	New record on *Sida rhombifolia*

Table 1: List of mite species recorded during 2004-2008 from different medicinal plants in different districts of West Bengal (*contd.*)

(a) List of phytophagous mite species: (*contd.*)

Mite species	Host plant/ habitat	District	Remarks
19. *Tetranychus* sp.	*Hibiscus vitifolius* Linn.	Hooghly	Species identification not possible for want of male species
Family 2. TENUIPALPIDAE Berlese			
Genus 8. *Brevipalpus* Donnadieu			
20. *Brevipalpus californicus* (Banks)	*Alstonia scholaris* (L.) R. Br., *Cassia alata* Linn., *Murraya koenigii* (L.) Spreng.	Kolkata & 24-Parganas (S)	New record on these hosts
21. *B. chilensis* Baker	*Azadirachta indica* Juss.	Purulia	New record on this host
22. *B. cucurbitae* Mohansundaram	*Ricinus communis* Linn., *Murraya koenigii* (L.) Spreng.	Cooch Behar 24-Parganas (S)	New record on this host
23. *B. deleoni* Pritchard & Baker	*Ocimum gratissimum* Linn.	Kolkata & 24-Parganas (S)	New record on this hosts
24. *B. essigi* Baker	*Ocimum gratissimum* Linn.	Kolkata & 24-Parganas (S)	New record on this host
25. *B. euphorbiae* Mohansundaram	*Terminalia chebula* Retz.	Jalpaiguri	New record on this host
26. *B. karachiensis* Chaudhri, Akbar & Rasool	*Ocimum sanctum* Linn. *Ocimum basilicum* Linn.	Kolkata & 24-Parganas (S), Medinipur (W).	
27. *B. obovatus* Donnadieu	*Clerodendrum indicum* (L.) O. Kuntze, *Desmodium gangeticum* DC.	Kolkata & 24-Parganas (S), Medinipur (W)	New record on *Clerodendrum indicum*
28. *B. phoenicis* (Geij)	*Acacia catechu* (L.f.) Willd., *Ocimum gratissimum* Linn.	Howrah Kolkata & 24-Parganas (S)	New record on this host
29. *B. rugulosus* Chaudhri, Akbar & Rasool	*Justicia adhatoda* Linn.	Jalpaiguri	New record on these hosts
Family 3. ERIOPHYIDAE Nalepa			
Genus 9. *Aceria* Keifer			
30. *Aceria clerodendronis* Farkas	*Clerodendrum viscosum* Vent.	Howrah	
Genus 10. *Calepitrimerus* Keifer			
31. *Calepitrimerus azadirachtae* ChannaBasavanna	*Azadirachta indica* A. Juss	Medinipur (W)	
Genus 11. *Paratetra* ChannaBasavanna			
32. *Paratetra murrayae* ChannaBasavanna	*Murraya koenigii* (L.) Spreng.	Kolkata & 24-Parganas (S)	
Family 4. TARSONEMIDAE Kramer			
Genus 12. *Polyphagotarsonemus* Beer & Nucifora			
33. Polyphagotarsonemus latus (Banks)	*Withania somnifera* (L.) Dunal, *Ocimum sanctum* Linn.	Kolkata & 24-Parganas (S)	

(b) List of predatory mite species:

Mite species	Host plant/ habitat	District	Remarks
Order I. PROSTIGMATA			
Family 5. ANYSTIDAE Oudemans			
Genus 13. *Anystis* von Heyden			
34. *Anystis baccarum* (Linnaeus)	*Cinchona officinalis* Linn.	Darjeeling	
Family 6. BDELLIDAE Duges			
Genus 14. *Bdellodes* Oudemans			
35. *Bdellodes augusta* Roy and Saha	*Ambroma augusta* (L.) L.f.	Kolkata & 24-Parganas (S)	New species, already published

Table 1: List of mite species recorded during 2004-2008 from different medicinal plants in different districts of West Bengal (*contd.*)

(b) List of predatory mite species: (*contd.*)

Mite species	Host plant/ habitat	District	Remarks
36. *B. manipurensis* Gupta	*Andrographis paniculata* (Burm. f.) Wall. ex Nees	Kolkata & 24-Parganas (S)	New record on this habitat
Family 7. CHEYLETIDAE Leach			
Genus 15. *Chelacaropsis* Baker			
37. *Chelacaropsis moorei* Baker	*Nyctanthes arbor-tristis* Linn.	Kolkata & 24-Parganas (S)	New record on this habitat
Family 8. CUNAXIDAE Thor			
Genus 16. *Cunaxa* von Heyden			
38. *Cunaxa mangiferae* Gupta	*Carica papaya* L.	Kolkata & 24-Parganas (S)	
39. *C. myabunderensis* Gupta and Ghosh	*Zingiber* sp.	Darjeeling	
40. *C. setirostris* (Hermann)	*Ficus glomerata* Roxb., *Ocimum gratissimum* L., *Withania somnifera* (L.) Dunal	Kolkata & 24-Parganas (S)	New record on *Ocimum gratissimum* and *Withania somnifera*
41. *C. womersleyi* Baker & Hoffmann	*Datura metel* Linn., *Bauhinia acuminata* Linn., *Ocimum sanctum* Linn.	Kolkata & 24-Parganas (S), Howrah, Darjeeling	
Genus 17. *Neocunaxoides* Smiley			
42. *Neocunaxoides* sp.	*Clerodendrum viscosum* Vent.	Howrah	
Family 9. ERYTHRAEIDAE Robineau-Desvoidy			
Genus 18. *Erythraeus* Latreille			
43. *Erythraeus cinchoni* Roy *et al.*	*Cinchona officinalis* Linn.	Darjeeling	New species, already published out of this work
Family 10. RAPHIGNATHIDAE Kramer			
Genus 19. *Exothorhis* Summers			
44. *Exothorhis justicia* Roy *et al.*	*Justicia adhatoda* Linn.	Kolkata & 24-Parganas (S)	New species, already published out of this work
Family 11. EUPODIDAE Koch			
Genus 20. *Eupodes* Koch			
45. *Eupodes sigmoidensis* Strandtmann and Goff	*Acacia* sp.	Kolkata & 24-Parganas (S)	
Family 12. STIGMAEIDAE Oudemans			
Genus 21. *Agistemus* Summers			
46. *Agistemus albae* Roy *et al.*	*Morus alba* Linn.	Darjeeling	New species, already published out of this work
47. *A. edulis* Gupta	*Mangifera indica* Linn.	Kolkata & 24-Parganas (S)	
48. *A. fleschneri* Summers	*Desmodium gangeticum* (L.) DC, *Gymnema sylvestre* (Retz.) R. Br. ex Schult, *Justicia adhatoda* Linn.	Midnapore (W), Hooghly, Kolkata & 24-Parganas (S);	New record from these habitats
49. *A. lobata* Roy *et al.*	*Urena lobata* Linn.	Kolkata & 24-Parganas (S)	New species, already published out of this work.
50. *A. simplex* Gonzalez-Rodriguez	*Zingiber* sp.	Darjeeling	
51. *A. terminalis* (Quayle)	*Dioscorea* sp.	Jalpaiguri	
52. *A. unguiparvus* Gonzalez Rodriguez	*Aristolochia indica* Linn.	Darjeeling	

Table 1: List of mite species recorded during 2004-2008 from different medicinal plants in different districts of West Bengal (*contd.*)

(b) List of predatory mite species: (*contd.*)

Mite species	Host plant/ habitat	District	Remarks
Family 13. TYDEIDAE Kramer			
Genus 22. *Lorryia* Oudemans			
53. *Lorryia* sp.	*Terminalia myriocarpa* Van Heurck & Müll. Arg.	Darjeeling	
Genus 23. *Parapronematus* Baker			
54. *Parapronematus murshidabadensis* Gupta	*Alstonia scholaris* (L.) R. Br., *Cassia alata* Linn., *Crateva nurvala* Buch.-Ham.	Kolkata & 24-Parganas (S), Medinipur	New record on *Crateva nurvala*
Genus 24. *Pronematus* Canestrini			
55. *Pronematus fleschneri* Baker	*Pterocarpus santalinus* Linn.f.	Kolkata & 24-Parganas (S)	New record on this habitat
56. *P. sextoni* Baker	*Bauhinia acuminata* Linn.	Howrah	
Genus 25. *Tydeus* Koch			
57. *Tydeus cumini* Gupta	*Thevetia neriifolia* Juss. ex Steud, *Ficus carica* L.	Howrah, Purulia	New record on this habitat
58. *T. justicia* Roy *et al.*	*Justicia adhatoda* Linn.	Kolkata & 24-Parganas (S)	New species, already published
59. *Tydeus* sp.	*Ficus* sp.	Kolkata	Could not be identified due to damaged condition
Order II. ASTIGMATA Canestrini			
Family 14. ACARIDAE Ewing & Nesbitt			
Genus 26. *Acarus* Linnaeus			
60. *Acarus farris* Oudemans	*Datura metel* Linn.	Kolkata & 24-Parganas (S)	New record on this habitat
Genus 27. *Caloglyphus*			
61. *Caloglyphus rhizoglyphoides* (Zachvatkin)	*Gossypium herbaceum* Linn.	Kolkata & 24-Parganas (S)	New record on this habitat
Genus 28. *Tyrophagus* Oudemans			
62. *Tyrophagus putrescentiae* (Schrank)	*Solanum nigrum* Linn., *Justicia adhatoda* Linn.	Kolkata & 24-Parganas (S)	New record on these habitats
Family 15. AMEROSEIIDAE			
Genus 29. *Kleemannia* Oudemans			
63. *Kleemannia plumigera* Oudemans	*Alstonia scholaris* (L.) R. Br.	Kolkata & 24-Parganas (S)	New record on this habitat.
Order III. MESOSTIGMATA			
Family 16. ASCIDAE Voigts & Oudemans			
Genus 30. *Lasioseius* Berlese			
64. *Lasioseius phytoseioides* Chant	*Alstonia scholaris* (L.) R. Br.	24-Parganas (N)	New record on this habitat
65. *L. quadrisetosus* Chant	*Nyctanthes arbor-tristis* Linn.	24-Parganas (N)	New record on this habitat
66. *L. terrestris* Menon & Ghai	*Boerhavia diffusa* Linn., *Datura metel* Linn.	Kolkata & 24-Parganas (S), Nadia	New record on this habitat
67. *Lasioseius* sp.	*Alstonia scholaris* (Linn.) R. Br.	Kolkata & 24-Parganas (S)	New record on this habitat, Could not be identified due to damaged condition
Family 17. PHYTOSEIIDAE Berlese			
Genus 31. *Amblyseius* Berlese			
68. *Amblyseius aerialis* (Muma)	*Clerodendrum siphonanthus* R. Br.	Darjeeling	

Table 1: List of mite species recorded during 2004-2008 from different medicinal plants at different Districts of West Bengal (*contd.*)

(b) List of predatory mite species: (*contd.*)

Mite species	Host plant/ habitat	District	Remarks
69. *A. channabasavannai* Gupta	*Ambroma augusta* (Linn.) L.f	Kolkata & 24-Parganas (S) Medinipur (West)	
70. *A. cucurbitae* Rather	*Nyctanthes arbor-tristis* Linn.	24-Parganas (North)	New record on this habitat
71. *A. herbicolus* (Chant)	*Cinchona officinalis* Linn., *Coccinia indica* W.A.	Darjeeling, Kolkata & 24-Parganas (S)	
72. *A. kulini* Gupta	*Murraya koenigii* (L.) Spreng.	Kolkata & 24-Parganas (S)	
73. *A. largoensis* (Muma)	*Aristolochia indica* Linn. *Gymnema sylvestre* (Retz.) R. Br. ex Schuit, *Aegle marmelos* (L.) Corr. ex Roxb. *Alstonia scholaris* R. Br. *Azadirachta indica* A. Juss. *Boerhavia diffusa* Linn. *Carica papaya* L. *Curcuma zedoaria* Rosc. *Justicia adhatoda* Linn.	Darjeeling Hooghly, Cooch Behar Jalpaiguri, Purulia, Nadia, Kolkata, & 24-Parganas (S)	New habitat records on *Aegle marmelos, Alstonia scholaris, Curcuma zedoaria*
74. *A. paraaerialis* Muma	*Acacia catechu* (L.f.) Willd. *Carica papaya* L.	Kolkata & 24-Parganas (S)	New record from habitat *Acacia catechu*
Genus 32. *Euseius* Wainstein			
75. *Euseius alstonae* (Gupta)	*Aegle marmelos* (L.) Corr. ex Roxb., *Alstonia scholaris* R. Br., *Cassia alata* Linn.	Hooghly, Kolkata & 24-Parganas (S)	
76. *E. coccineae* (Gupta)	*Morus alba* Linn.	Darjeeling	
77. *E. coccosocius* (Ghai & Menon)	*Desmodium motorium* (Houtt.) Merril	Darjeeling	
78. *E. eucalypti* (Ghai & Menon)	*Coccinia grandis* (Linn.) Voigt	24-Parganas (North)	New record from habitat
79. *E. finlandicus* (Oudemans)	*Quercus incana* Roxb., *Justicia adhatoda* Linn.	Darjeeling, Kolkata & 24-Parganas (S)	New record from habitat
80. *E. macrospatulatus* (Gupta)	*Tinospora cordifolia* (Willd.) Hook.f. & Thoms.	Nadia	
81. *E. ovalis* (Evans)	*Aegle marmelos* (L.) Corr. ex Roxb.	Kolkata & 24-Parganas (S)	
82. *E. pruni* (Gupa)	*Clematis buchananian* DC	Darjeeling	
Genus 33. *Neoseiulus* Hughes			
83. *Neoseiulus longispinosus* (Evans)	*Oroxylum indicum* Vent., *Datura metel* Linn., *Carica papaya* L.	Purulia, Kolkata & 24-Parganas (S)	New habitat record from *Oroxylum indicum*
Genus 34. *Paraphytoseius* Swirski & Schecter			
84. *Paraphytoseius multidentatus* (Swirski and Shechter)	*Ambroma augusta* (Linn.) L.f., *Ocimum sanctum* Linn., *Ficus carica* L.	Midnapore, Kolkata & 24-Parganas (S)	
Genus 35. *Proprioseiopsis* Muma			
85. *Proprioseiopsis peltatus* (Van der Merwe)	*Nyctanthes arbor-tristis* Linn.	Kolkata & 24-Parganas (S)	New record from habitat
Genus 36. *Typhlodromips* De Leon			
86. *Typhlodromips suknaensis* (Gupta)	*Barleria lupulina* Lindl., *Datura metel* Linn., *Murraya koenigii* (L.) Spreng.	Kolkata & 24-Parganas (S)	New habitat record from *Barleria lupulina*

Table 1: List of mite species recorded during 2004-2008 from different medicinal plants in different districts of West Bengal (*contd.*)

(b) List of predatory mite species: (*contd.*)

Mite species	Host plant/ habitat	District	Remarks
87. *T. syzygii* (Gupta)	*Abelmoschus moschatus* Medik., *Asteracantha longifolia* (L.) Nees	Medinipur, Kolkata & 24-Parganas (S)	New record on *Asteracantha longifolia*
Genus 37. *Gynaeseius* Wainstein			
88. *Gynaeseius eharai* (Gupta)	*Nerium indicum* L.	Kolkata	
89. *Gynaeseius* sp.	*Aristolochia indica* Linn.	Darjeeling	
Genus 38. *Iphiseius* Berlese			
90. *Iphiseius* (*Trochoseius*) *augusta* Roy *et al.*	*Ambroma augusta* L.f.	Kolkata & 24-Parganas (S)	New species, already published out of this work
Genus 39. *Phytoseius* Ribaga			
91. *Phytoseius intermedius* Evans & Macfarlane	*Clerodendrum viscosum* Vent.	Howrah	New record from habitat
92. *P. kapuri* Gupta	*Ficus* sp.	Howrah	New record from habitat
93. *P. maldahensis* Gupta	*Zingiber* sp.	Darjeeling	
94. *P. mizoramensis* Gupta & Chatterjee	*Clerodendrum viscosum* Vent.	Howrah	
95. *P. neocomiger* Gupta	*Abelmoschus moschatus* Medik.	Howrah	
96. *P. viscosum* Roy & Saha	*Clerodendrum viscosum* Vent.	Howrah	New species, already published out of this work
Genus 40. *Typhlodromus* Scheuten			
97. *Typhlodromus* (*Amblydromella*) *himalayensis* Gupta	*Clematis buchananian* DC	Darjeeling	
98. *T. (A.) homalii* Gupta	*Aegle marmelos* (L.) Corr. ex Roxb.	Kolkata & 24-Parganas (S)	
99. *Typhlodromus* (*Anthoseius*) *majumderi* Gupta	*Ficus glomerata* Roxb.	Kolkata & 24-Parganas (S)	New record from habitat

represented by 7, 7 and 6 species, respectively. *Amblyseius largoensis* and *Paraphytoseius multidentatus* were recorded as most abundant as well as efficient predators. During collection a total of 12 species were observed as most seriously infesting medicinal plants doing considerable damage (Table 2).

The present research documents a pioneer initiative in the study area covering 14 out of 19 districts of West Bengal, India, and incorporates broad survey and appraisal of more than 80 different medicinal plants for evaluation of mite infestations. Earlier a number of regional and fragmented

Table 2: List of most injurious mites along with their hosts and pertaining damage symptoms

Mite Species	Host Plant	Nature of damage
Petrobia (*Tetranychina*) *harti* (Ewing)	*Oxalis corniculata* Linn.	Infested leaves turn initially yellow, later brown and and finally dry up.
Tetranychus hydrangeae Pritchard & Baker	*Datura innoxia* Mill.	Infested leaves develop white patches at the points of infestation which later turn brown and leaves wither.
Tetranychus ludeni Zacher	*Abutilon indicum* (Linn.) Sweet, *Clitoria ternatea* Linn., *Tinospora cordifolia* (Willd.) Hook.f. & Thoms.	Infested leaves turn yellow, dry up and fall off.
Tetranychus neocaledonicus Andre	*Withania somnifera* (L.) Dunal *Leucas plukenetii* (Roth.) Spreng, *Justicia adhatoda* Linn.	Infested leaves show discolouration at the points of feeding giving yellow patches at later stage of infestation.
Tetranychus urticae Koch	*Withania somnifera* (L.) Dunal,	Appearance of yellowish spots on leaves. Later such leaves turn chocolaty brown and subsequently wither.
Oligonychus indicus (Hirst)	*Musa paradisiaca* Linn. *Cocos nucifera* Linn.	Feeding causes whitish patches on leaves.

Table 2: List of most injurious mites along with their hosts and pertaining damage symptoms (*contd.*)

Mite Species	Host Plant	Nature of damage
Oligonychus oryzae (Hirst)	*Cymbopogon winterianus* Jawitt	Leaves develop whitish patches at the points of feeding, later such leaves wither.
Schizotetranychus hindustanicus (Hirst)	*Murraya koenigii* (L.) Spreng.	Infested leaves become yellowish white mosaic spots.
Schizotetranychus cajani Gupta	*Murraya koenigii* (L.) Spreng.	Infested leaves become yellowish, smaller in size and later dry up.
Panonychus citri (McGregor)	*Carica papaya* Linn.	Infested leaves showed discolouration near petiole attachment.
Brevipalpus karachiensis Chaudhri, Akbar & Rasool	*Ocimum sanctum* Linn.	The infested leaves become pale yellow and later brownish spots appear at the points of feeding. Drying of leaves also observed.
Polyphagotarsonemus latus (Banks)	*Withania somnifera* (L.) Dunal	Leaves become curled and wrinkled, later such leaves wither.

studies have been made by several workers from India. Ghosh and Gupta (2003) and Lahiri *et al.* (2004) reported 54 and 51 species of mites infesting medicinal plants of West Bengal, respectively. Recently, from Darjeeling Himalayas, Roy *et al.* (2008b, c) recorded 24 species of mites infesting medicinal plants. Rolania and Sharma (2008) made a faunistic survey on mite pests infesting medicinal plants from Rajasthan. They recorded 4 phytophagous mites from 16 medicinal plants. The present study includes new reports of 21 species of phytophagous mites from their respective host plants and 27 species of predatory mites for the first time from their respective habitats. The results of the present study are expected to supplement the existing information on the pest status of mites on different medicinal plants apart from elaborating mite species diversity in the longitudinal biogeographical scale of West Bengal, India. Practically no record has been made from rest of the world about mite infestation on medicinal plants. These facts highlight a big lacuna in the study of mite fauna of conventional medicinal plants, and emphasize the need for a holistic approach towards this end. Further, the results will provide a basis for future work on mite-medicinal plant interactions and evaluation of strategic planning for management of medicinal plants and their utility.

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9. FIRST RECORD OF *LIOCHELES NIGRIPES* (POCOCK, 1897) (SCORPIONES: HEMISCORPIIDAE) FROM CHHATTISGARH, WITH COMMENTS ON ITS DISTRIBUTION

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Introduction

The scorpion family Hemiscorpiidae currently consists of approximately 12 genera and 93 species globally (Rein 2011). Members of the family are widely distributed throughout tropics and the subtropics of all continents.

The family was previously known as Ischnuridae, but due to nomenclatural conflict with Odonata subfamily (Ischnurinae) it was changed to Liochelidae. In 2005, Soleglad, Fet and Kovaǫík included the genus *Heteroscorpion* in this family and renamed it Hemiscorpiidae, including in it all genera and species previously included in Liochelidae (Soleglad *et al.* 2005).

The family is distinguishable by the following set of characters: weak laterally compressed metasoma, tarsomere II of the legs in lateral view forming a right angle with claw base and 'C' type of trichobothrial pattern with only three ventral trichobothria on patella.

In India, Family Hemiscorpiidae is represented by three genera, namely *Lomachus*, *Chiromachetes* (endemic) and *Liocheles* comprising of eight species in all (Tikader and Bastawade 1983; Rein 2011).

Of these, genus *Liocheles* is widely distributed in Cameroon (probably imported), Australia, China, India, Indonesia, Laos, Malaysia, Myanmar and Vietnam. An explanation to its wide distribution is given by Polis (1990) ... "The genus *Liocheles*, which hypothetically arose in India, secondarily invaded south-eastern Asia and Indonesia, and eventually Australia. Although Australia was a portion of Gondwanaland, it has been suggested that *Liocheles* dispersed there *via* land connections between south-eastern Asia and New Guinea, and between New Guinea and Australia at various times during the Cenozoic. This is supported by the fact that the three species of *Liocheles* in Australia are not endemic and are restricted to the north-eastern portion of that continent."

The genus currently comprises of at least six species of which two, namely *Liocheles nigripes* and *Liocheles australasiae* have been reported from India. Of these *Liocheles australasiae* is known only from the Andaman and Nicobar Islands, making *Liocheles nigripes* the sole representative of genus *Liocheles* from mainland India (Tikader and Bastawade 1983; Kovaǫík and Fet 2006). Apart